

CLAIMS

1. A process to load a drug into a cross-linked polymer, comprising the following steps:
 - a. pre-treating said cross-linked polymer with a supercritical fluid;
 - 5 b. contacting said pre-treated cross-linked polymer with a supercritical fluid containing the drug dissolved therein;
 - c. removing the supercritical fluid, thereby causing the drug to precipitate inside the cross-linked polymer.
2. Process according to claim 1, wherein in step a. , the cross-linked polymer is
10 maintained in contact with the supercritical fluid for a time comprised between 1 minute and 6 hours.
3. Process according to claims 1-2, wherein in step a. , the cross-linked polymer is maintained in contact with the supercritical fluid for a time comprised between 5 minutes and 4 hours.
- 15 4. Process according to claims 1-3, wherein in step b. , the pre-treated cross-linked polymer is maintained in contact with the supercritical fluid for a time comprised between 2 minutes and 48 hours.
5. Process according to claims 1-4, wherein in step b. , the pre-treated cross-linked polymer is maintained in contact with the supercritical fluid for a time
20 comprised between 10 minutes and 12 hours.
6. Process according to claims 1-5, wherein the contact of the cross-linked polymer with the supercritical fluid is effected in static and/or dynamic conditions.
7. Process according to claims 1-6, wherein said supercritical fluid is chosen
25 among carbon dioxide, ethylene, propylene, chlorofluorocarbon, nitrous oxide, and mixtures thereof.
8. Process according to claims 1-7, wherein said cross-linked polymer is chosen among cross-linked polyvinylpyrrolidone, cross-linked cellulose derivatives, starch and its derivatives, cyclodextrins and their derivatives, cross-linked
30 polystyrene, cross-linked acrylic polymers, and mixtures thereof.

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9. Process according to claims 1-8, further characterised in that the thus loaded drug is present in the cross-linked polymer in high amorphous and nanocrystalline fraction.
- 5 10. A method to increase the drug-loading capacity of a cross-linked polymer, consisting in treating said cross-linked polymer with a supercritical fluid not containing any drugs.
11. Method according to claim 10, wherein the cross-linked polymer is maintained in contact with the supercritical fluid for a time comprised between 1 minute and 6 hours.
- 10 12. Method according to claims 10-11, wherein the cross-linked polymer is maintained in contact with the supercritical fluid for a time comprised between 5 minutes and 4 hours.
13. Method according to claims 10-12, wherein the contact of the polymer with the supercritical fluid is effected in static and/or dynamic conditions.
- 15 14. Method according to claims 10-13, wherein the supercritical fluid is chosen among carbon dioxide, ethylene, propylene, chlorofluorocarbon, nitrous oxide, and mixtures thereof.
15. Method according to claims 10-14, wherein the cross-linked polymer is chosen among cross-linked polyvinylpyrrolidone, cross-linked cellulose derivatives, 20 starch and its derivatives, cyclodextrins and their derivatives, cross-linked polystyrene, cross-linked acrylic polymers, and mixtures thereof.
16. Modified cross-linked polymer, having enhanced drug-loading properties, obtainable from a polymer selected from the group consisting of cross-linked polyvinylpyrrolidone, cross-linked cellulose derivatives, starch and its 25 derivatives, cyclodextrins and their derivatives, cross-linked polystyrene and mixtures thereof by treating the sole cross-linked polymer with a supercritical fluid not containing any drug.
17. Modified cross-linked polymer according to claim 16, obtainable by treating the sole cross-linked polymer with the supercritical fluid for a time comprised 30 between 1 minute and 6 hours.

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18. Modified cross-linked polymer according to claims 16 or 17, obtainable by treating the sole cross-linked polymer with the supercritical fluid for a time comprised between 5 minutes and 4 hours.
19. Modified cross-linked polymer according to claims 16-18, wherein the
5 supercritical fluid is chosen among carbon dioxide, ethylene, propylene, chlorofluorocarbon, nitrous oxide, and mixtures thereof.
20. Modified cross-linked polymer according to claims 16-19, loaded with a drug.
21. Pharmaceutical composition containing the modified cross-linked of claim 20.